

CFC Phaseout Implications for Commercial Cooling



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U.S. Environmental
Protection Agency

April 3, 1997

What are CFCs and HCFCs?

CFCs: Chlorofluorocarbons

HCFCs: Hydrochlorofluorocarbons

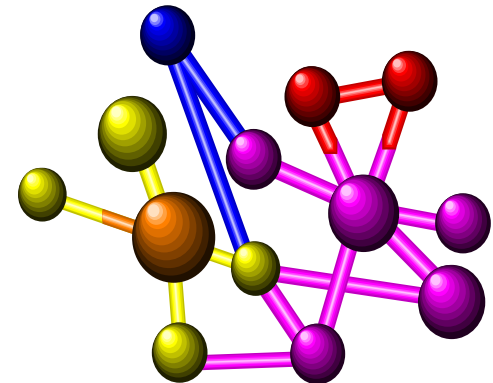
Release of these refrigerants to the atmosphere causes

- **Ozone depletion**
- **Global warming**

CFCs - Worst for Environment

HCFCs - Very Bad for Environment

HFCs - No Chlorine (ODP = 0)



Common Applications by Refrigerant

CFC-11

Centrifugal Chillers (low pressure)

CFC-12

Automotive Air Conditioning
Residential Refrigeration
Commercial Refrigeration
Centrifugal Chillers

HCFC-22

Unitary A/C & Heat Pumps
Screw Compressors
Centrifugal Chillers (high pressure)

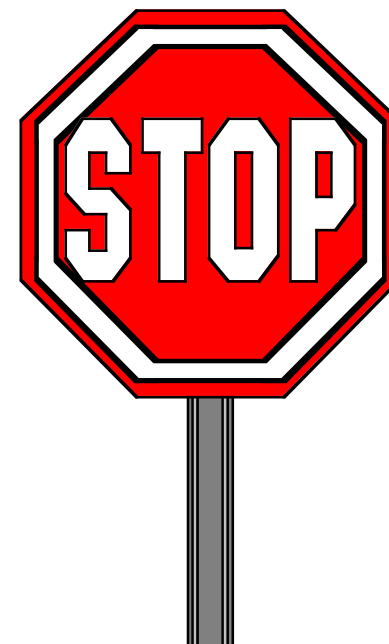
What is the CFC Phaseout?



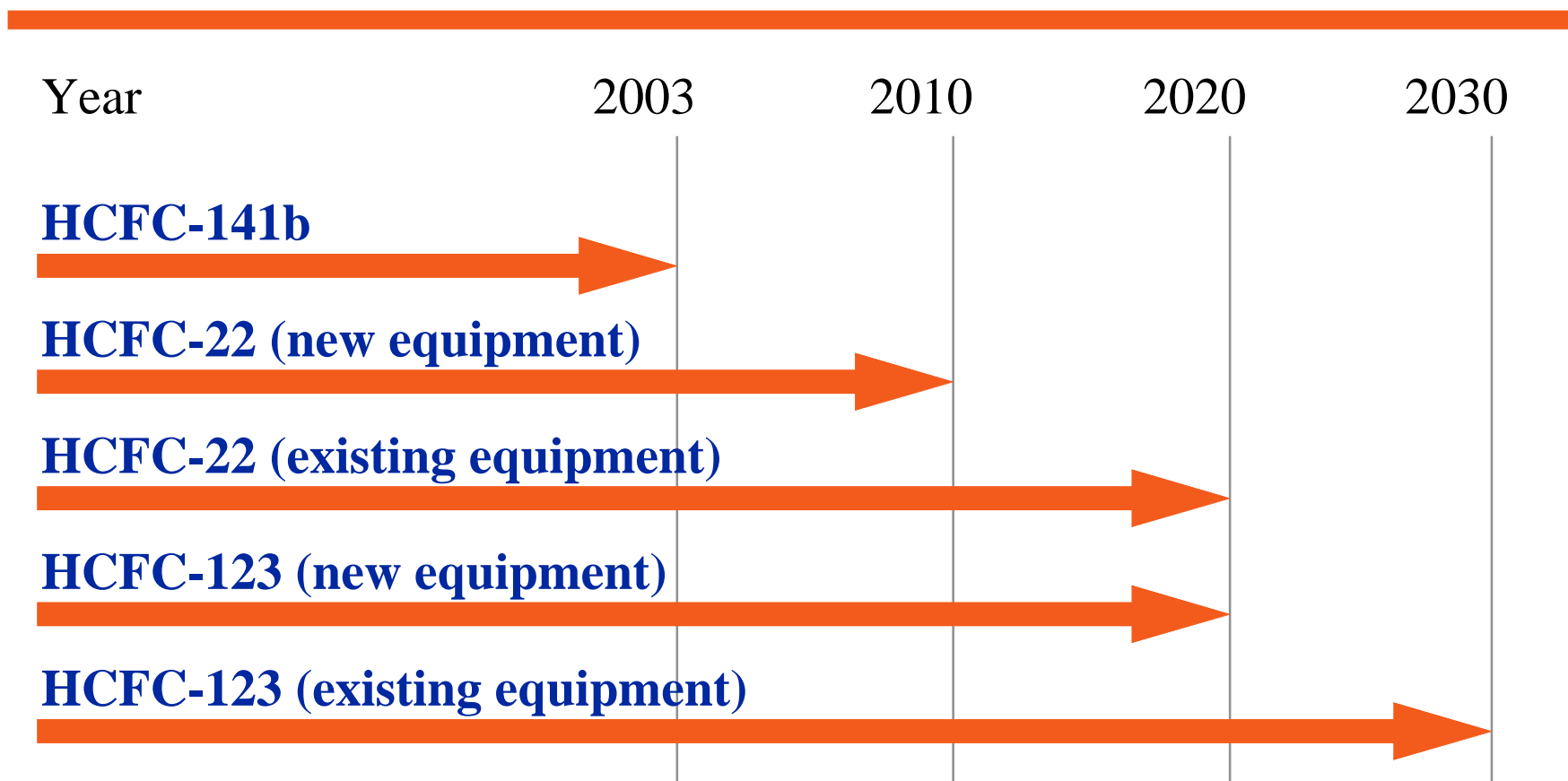
- U.S. response to stratospheric ozone depletion
- 1990 Clean Air Act
- CFC & HCFC production phaseouts
- Mandatory refrigerant recycling
- Significant New Alternatives Program (SNAP)

CFC Phaseout Schedule

CFC production
halted
January 1, 1996



HCFC Phaseout Schedule



No HFC Phaseout Scheduled

- HFCs OK
- HFC Contains no Chlorine
- Ozone Depletion Potential = 0

*No HFC
Phaseout
Scheduled*



R-134a



HFC-410a



HFC-407c

How Does the CFC Phaseout Affect Me?



- No more CFC production
- CFC shortages are here
- Many CFC chillers still not upgraded
- Large amounts of money at stake

Additional Mandatory EPA Recycling Regulations



- Purge losses OK, venting isn't
- Refrigeration technician certification
- Recovery and recycling required
- Refrigerant record keeping
- Safe disposal requirements
- Fines are involved

EPA Stratospheric Ozone Hotline & Web Site

<http://www.epa.gov/ozone>
Hotline: (301) 614-3390



Conventional Wisdom: Your Options

- Do nothing (“head in the sand”)
- Contain (CFC Banking)
- Convert
 - Simple retrofit: try to maintain capacity or efficiency
 - Engineered retrofit: maintain capacity and efficiency
- Replace (Large capital investment)

Beyond Conventional Wisdom:

The CFC Phaseout Is an Opportunity




- Opportunity to better understand your building and current chiller stock
 - Energy audit
 - Quantify your cooling energy use
- Reduce cooling loads in your building
- “Right-size” your equipment

Containment Opportunities

- You may have 30 years of CFCs in stock
- CFC banking
 - Look at all chillers and facilities
 - Formulate a plan
- High-efficiency purge units

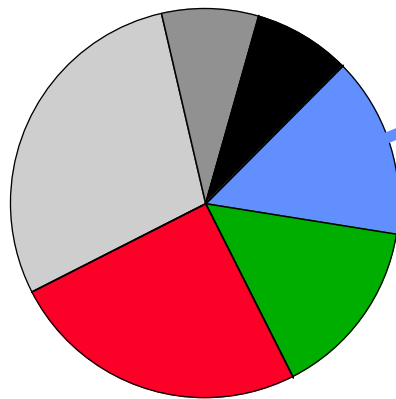


Conversion Opportunities

- Transitional refrigerants
 - CFC-12  HFC-134a
 - CFC-11  HCFC-123
 - HCFC-22  HCFC-22 (407c)
- Not “drop-in” substitutes
- Modification to equipment and operation usually required

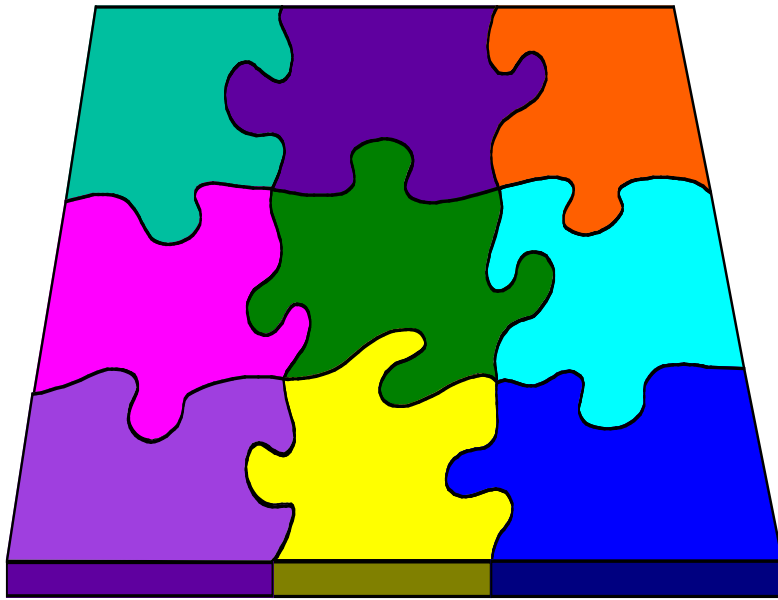
Replacement Opportunities

- Don't just design a new chiller, design a new chiller plant
- Typical plant:
 - Chillers make up 60% of connected load
 - Cooling towers, fans, and pumps make up 40% of connected load



Cooling end-use: 15%
Chiller end-use: 9%
(% of electrical energy)

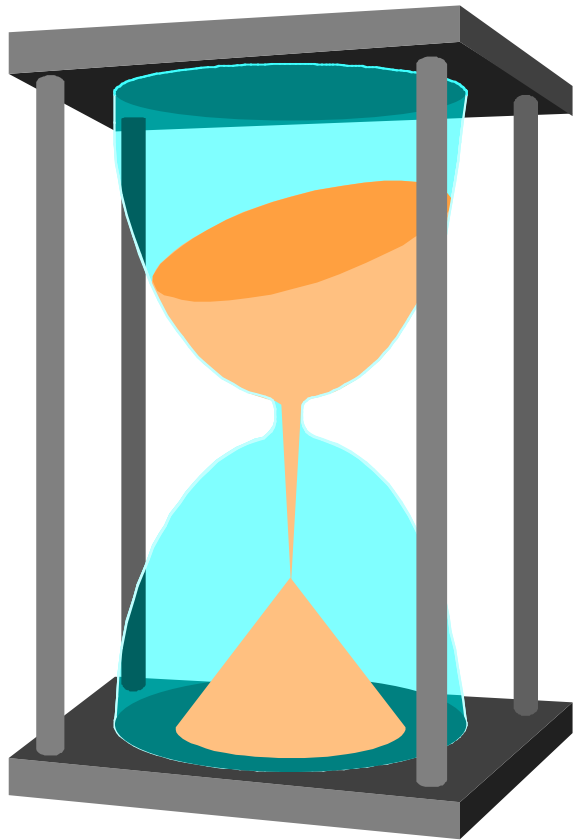
The Big Opportunity: Integrated Chiller Retrofit



Cool \$ense

Carefully consider
the interaction of all
building systems

Hurry up and Plan



- Designate a facility refrigerant manager
- Conduct inventory of equipment and refrigerants
- Develop a refrigerant management plan

Voluntary Government Programs

DOE

Rebuild America



EPA

ENERGY STAR BUILDINGS

